
**exploring the world of transportation** **January–February 2007**

## What is Go!

*Go!* is a free, online magazine for teens and young adults that explores the

## Feature Articles

**Learning to drive a snowplow**

A high school student takes the Iowa DOT's snowplow simulator for a test drive.

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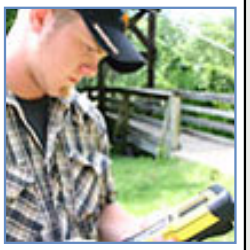
**School spotlight**

Iowa State University offers four different majors related to transportation



transportation and the careers they can find there.

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**Winter weather flying: How do they do that?**

The dangers of snow and ice on planes and runways.

**Brr! Cold weather construction**

Find out who does construction in the winter.

**Train your brain**

Traffic signs and signals quiz

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Fighting snow and ice can take a toll on the environment

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# Learning to drive a snowplow

by Michele Regenold

Megan Kroeger, 14, slides behind the wheel of the snowplow simulator and turns on the "engine." The sound of a diesel truck engine starting up fills the trailer. The driver's seat and steering wheel vibrate.

Megan looks through the simulated windshield at the snow-covered highway. She grips the steering wheel, takes a deep breath, and reaches for the accelerator.

“I know you’re going to put your seatbelt on,” says Scott Robinson, a snowplow operator with 10 years of experience and one of the Iowa Department of Transportation’s trainers.

Megan laughs and straps on the seatbelt. Then she eases the truck down the ramp and on to a four-lane divided highway. She’s had a learner’s permit for three months.

Megan Kroeger, 14, takes the wheel of the Iowa DOT's snowplow simulator.

“Find the centerline and work from the centerline out,” Robinson tells her. He stands a couple of steps behind Megan’s shoulder.

She maneuvers the truck into the right lane and slowly picks up speed. She can see traffic in her rear view mirror and out her side window as a car starts to pass her.

The snowplow simulator “can do everything a real truck can do,”

Robinson says. That includes turning around, spreading salt, sliding into a ditch, and getting rear ended by other drivers.

Megan can see a semi in her left side mirror.

"Nobody's crashed this one yet," jokes John Haas, executive officer in the Iowa DOT's Office of Maintenance.

The simulator looks like a game at a video arcade. It has a driver's seat, a steering wheel, and a 180-degree display that simulates the windshield and side windows. It has all the controls of a truck—a seat belt, accelerator, brakes, turn signals. The sound effects, visual effects, and physical effects are all synchronized. If the truck spins out, the driver hears it, sees it, and feels

The simulator is installed in a trailer that gets hauled all around the state. The Iowa DOT has trained about 600 people so far using the new simulator.

A view out the snowplow simulator's windwhield. The red sign with a white arrow tells the driver which way to turn.

When a driver trainee is in the simulator, the trainer can monitor his or her progress from a computer at the other end of the trailer. The trainer can also add obstacles—like a deer or a stalled vehicle—that the driver has to react to. Or the trainer can

change the scenario from daytime to nighttime, or from four-lane to two-lane, or urban to rural.

Other hazards that snowplow drivers face, in real life and in the simulator, include

- poor visibility due to a blizzard, high winds, and/or nighttime plowing
- icy roads and bridges
- aggressive drivers
- slow or fast vehicles

In the simulator, drivers get a chance to react to hazards—and make mistakes—that it would be too dangerous to practice on in real life.

Robinson says the simulator lets snowplow drivers practice “decision driving” in stressful situations. Both new and experienced drivers benefit from the practice.

In addition to training in the simulator, each new Iowa DOT driver/operator is paired with an experienced operator. The new operator rides along for several snow events and then drives with his or her mentor in the truck. The mentor decides when the new operator is ready to go it alone.

Operating a snowplow is tough duty. The first shift of a new storm can last up to 16 hours. After that, shifts run no more than 12

hours until the storm is over and the roads are cleared.

Operators are assigned specific routes that they plow. Robinson, for example, plows Interstate 35 in Iowa from mile marker 111 in Ames north to mile marker 128. It takes Robinson about one and a half hours to complete one circuit, depending on how much and how heavy the snow is.


One of the Iowa DOT's new snowplows is ready to go.

After one full circuit, he returns to the maintenance garage to refill his truck with salt or brine and has something to eat or drink himself. Keeping the snowplow driver well fueled is important for everyone's safety.

Megan has gotten the truck up to 40 miles per hour, the standard for plowing on the Interstate. She realizes she's coming up on a slow semi. She glances in her rear view and side view mirrors.

"Signal your intentions," Robinson says.

She flips on the turn signal and pulls into the left lane, barely missing the semi. It was going slower than she

**Safe driving tips for winter weather**

Turn on your lowbeam headlights. It might not help you see, but it'll help others see you.

Give snowplows lots of room to work. If you must pass, look out for a "wing" plow that may stick out on either side of the plow.

thought.

Once she's past the semi, a car zooms up on her right. It's trying to pass on the right. It bumps Megan and she spins into the median.

The truck comes to a stop in the snowy median. Megan is breathing hard. "This is so terrifying," she says.

The truck is okay. She kept it from sliding into oncoming traffic. And bonus! She's not stuck. She won't have to call a wrecker.

"Get yourself out of there and keep going," Robinson says.

Megan checks for traffic, signals her intention, and pulls back onto the Interstate. She has a job to do and she's going to do it.

Be aware that bridges and ramps might be slippery even if the roads aren't.

Accelerate slowly to keep your vehicle under control.

Brake carefully and give yourself more time and space to stop. If you have anti-lock brakes, press and hold. If you don't, tap and release, tap and release, until you stop.

Don't use the cruise control when there's snow, ice, or slush on the road.

Don't drive in a blizzard or blowing snow that limits your visibility. Wait it out.

Wear your seatbelt. Always.

# About the job: Equipment (snowplow) operator

## Basic requirements / qualifications

You have to be at least 18 years old to become an equipment operator for the Iowa DOT. You need a class B

commercial driver's license (CDL), and you have to get a class A CDL soon after being hired.

Competition for these jobs is pretty stiff. Quite a few people in their forties or fifties change careers and come to work at the Iowa DOT as equipment operators. At the Iowa DOT, the equipment operator position is the entry-level job for all technician jobs in maintenance, construction, and materials.

The position is year-round. When it's not snowing, operators help maintain their equipment. They also do some outside maintenance like replacing guardrails. In warmer weather, operators help with work like road repair, sign installation, and mowing.

Michele Regenold is the editor of *Go!*.



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# Winter weather flying: How do they do that?

by Michele Regenold

On Jan. 13, 1982, Air Florida Flight 90 crashed into a Washington, D. C. bridge and plunged into the ice-covered Potomac River. The crash killed 74 of the 79 people aboard (passengers and crew) and four people on

the ground. The Boeing 737 had just taken off from Washington National Airport in Washington, D. C. on its way to Ft. Lauderdale, Florida.

A heavy snowfall that day temporarily closed the airport and delayed Flight 90's departure by nearly two hours. Thousands of planes fly in weather just as bad every year. They take off, fly to their destinations, and land safely. How do they do it? And what went wrong for Flight 90?

A snow-covered plane prepares for passengers.

## Before takeoff

In winter, before a passenger jet takes off, the second officer walks around the plane to check for ice on the wings and reports it to the captain. The captain calls the airline to deice the plane. When the weather's bad enough, the airlines automatically deice all their planes.

The deicing process is simple. A member of the airline's ground crew sprays the plane with a liquid deicing solution. It's sprayed on hot, under high pressure to melt ice and snow.

The deicing fluid contains about 90% glycol and 8% water. Glycol is an alcohol that lowers the freezing point of water from 32 degrees Fahrenheit to -58 degrees Fahrenheit. It's similar to the antifreeze used in cars.

Heated deicing fluid is sprayed on an airplane to melt frost, ice, and snow.

Planes that sit for less than 15 minutes before takeoff get deiced and they're done. Planes that have to wait longer before takeoff follow a two-step process. First, they get deiced. Then they get sprayed with an unheated anti-icing fluid. This fluid has a gluey quality that helps it stay on the plane and prevents additional ice from forming (*anti*-icing prevents and *de*icing removes).

Retired Northwest Airlines Capt. Jerry Gilliand says that at the first sign of weather that may cause ice (anytime it's 50 degrees Fahrenheit or colder and visible moisture is present), a jumbo jet pilot turns on engine anti-icing. Hot air from the jet engines runs through tubing inside the wings. The hot air heats the wings enough to prevent ice from forming and melt any that may have already formed. Engine anti-icing also keeps sensors working properly and giving accurate instrument readings. The captain may turn on engine anti-icing anytime it's needed, whether the plane is on the ground or in the air.

## Airborne

"Jumbo jets can fly through just about all winter weather," Gilliand says. He worked for Northwest for 33 years and

flew DC-10s. “You can take off in a blizzard as long as you have some forward visibility and can see the center line lights or markings.”

When a jumbo jet is in the air, traveling at 600 mph, snow blows right over the wings. It’s not a concern. But ice is another story.

When a plane is in the air, ice can form on it rapidly. If as little as half an inch of ice builds up on the wings, it changes the shape of the wing. The change in shape means that air no longer glides smoothly over and under the wing. That reduces lift. Without enough lift, it’s hard to keep the plane aloft.

Jets travel so fast that snow can't stick. Ice is another story.

Smaller planes with propellers don’t have the heat from a jet engine to warm the wings. Instead, many small planes have what are called deicing boots. They inflate to knock off ice from the leading edge of the wings. Sometimes they don’t remove all the ice, which makes flying a little trickier. The propeller, however, has an electric deicer that heats the blades.

Pilots of all sizes of aircraft say that if icing issues are taken care of, winter flying is great. Cold air is denser than warm air, so engines perform better. In warmer weather, air turbulence can upset stomachs and make jittery passengers even more nervous. In winter, the air is smooth.

## Landing

Visibility is important for landing.

For landing, visibility is critical, Gilliand says. If it's snowing, raining, or sleeting hard and visibility is at or near the minimum, pilots of large jets have only a few seconds from the time they see the runway to the time they land.

The co-pilot watches the instruments to make sure the autopilot (a system to control navigation) is working correctly. As the plane makes its final approach, the autopilot is flying. The captain monitors the instruments until the aircraft gets near the visibility minimums. Then the captain looks for the runway lights. If the lights are in sight, and the aircraft is at or above minimums, the captain disconnects the autopilot and manually lands the plane. If not, the captain does not land and instead follows procedures for a missed approach.

Usually a single person monitors instruments and the runway and lands the plane. The captain and co-pilot take turns. New jets (747s, 757s, and 767s) can be programmed to land themselves.

## Clean runway is crucial

Ice on the runway isn't as serious as ice on the wings Capt. Gilliand says. But it's still a major safety concern.

On Dec. 8, 2005, a Southwest Airlines jet slid off the end of a slippery runway at Chicago's Midway Airport. The plane skidded through a fence and onto a street where it crashed into a minivan. A boy in the van was killed. It was lightly snowing that day.

Keeping a runway clean and clear can be tough. At the Des Moines International Airport, the goal is to clean the runways in 30 minutes or less. Sometimes that means running plows in a conga line down the runway. Sometimes they have to turn right around and plow the area they just plowed again.

The runway is closed when it's being plowed. No one wants planes and plows to accidentally run into each other.

Plows used at large commercial airports usually have wider blades than plows used on roads. Since runways are wider than roads, the extra wide plows help get the work done faster.

Airport maintenance crews also operate

blowers that can shoot snow many feet away, well beyond the signs and lights that pilots need to see along the runway and taxi areas. For light, dry snow, crews drive sweepers or brooms.

In addition to snowplows, the Des Moines International Airport uses a blower to move snow. (Two photos above courtesy of Randy Craig, Des Moines International Airport.)

In Des Moines, the airport operates only one runway when the winter weather is bad (the main north-south runway because the wind is frequently out of the north). This runway has temperature sensors embedded in the pavement. When the pavement gets close to freezing, the maintenance crew sprays on a liquid anti-icing solution to help prevent ice from forming on the runway.

Airports often use liquid anti-icing instead of sand or salt. The problem with sand and salt is that they stay on the pavement after the ice and snow are melted.

On a runway, that's bad news because the grit might be sucked up into an engine and cause problems, says Shawn Arena, deputy aviation director for operations and maintenance for the Des Moines International Airport.

For example, an F-16 jet's air intake is "like a vacuum

**What happened to Flight 90**

After Air Florida Flight 90 was deiced, its departure was delayed because of heavy snow. More snow

cleaner," Arena says. So the runway must be very clean.

A clean, dry runway also provides the best friction between the concrete pavement and the wheels of an aircraft. (Friction is the resistance of the wheels rolling over the pavement.) After the Des Moines airport crew removes snow, they test the runway's friction. They drive an SUV down the runway and slam on the brakes. The SUV has a special meter on it that measures the friction.

Snowy or icy pavements are slippery, of course, which means there's less friction. Less friction means it's harder to stop.

If a runway is icy, the pilot of a jumbo jet will switch the engine to reverse thrust and use the brakes at the same time. Usually it's reverse thrust, then brakes. The engine roar a passenger hears right after touching down is the engine in reverse.

Jumbo jets have anti-skid brakes. If wheels start to slide,

and ice accumulated on the aircraft. The flight crew knew this. As they waited in line to take off, they maneuvered their aircraft close behind another plane's exhaust so it would help melt the snow and ice.

In its report on the crash, the National Transportation Safety Board said that this may have made things worse. It may have blocked parts of the engines and made the ice stick to the wings even more.

No one knows for sure why Flight 90's pilots didn't turn on the engine anti-icing. They knew it was off.

Gauges on Flight 90 gave inaccurate readings because probes in the engine were blocked by ice. When the plane took off, the engines didn't have as much thrust as the gauges indicated.

The National Transportation Safety Board concluded that the crash of Air Florida Flight 90 was caused by several things:

the brakes automatically release and then reapply, like a car's anti-lock brakes. Once the jet slows to 80 knots (about 92 miles per hour), the pilot uses only the brakes.

There's no question that ice and snow can make flying dangerous. But when flight crews, airline ground crews, and airport maintenance staff do their jobs properly, flying can be smooth and safe.

1. The flight crew didn't use the engine anti-icing capabilities.
2. The plane took off despite having ice and snow on its wings.
3. The captain didn't reject the takeoff even though his co-pilot pointed out some odd instrument readings several times.

The pilots also had limited experience with flying in winter. Maybe this led to their poor decisions.

# About the jobs

## Airline pilot

Do you love to fly? Most pilots have a passion for flying. You also need to be detail-oriented and concerned about the safety of your passengers and crew. Most of all you need flying experience. Learn more about how to become an airline pilot: http://travel.howstuffworks.com/pilot.htm.

### Basic requirements/qualifications

You can take lessons to earn a private pilot's license when you're 16, although you need to be 17 to get the license. To be an airline pilot, you need a commercial pilot certificate, which you earn after attending commercial pilot ground school and logging 250 hours of flight time. You may also need special ratings, like multi-engine and instrument. Many airlines require that pilots have a bachelor's degree.

You can take private lessons or train at a technical or community college such as Indian Hills Community College in Ottumwa, Iowa, or Iowa Central Community College in Webster City, Iowa. Learn more about these colleges' flight training programs:

- Indian Hills Community College
- Iowa Central Community College

### Airport field maintenance staff

In the winter, you'll do mainly snowplowing and related activities. In warmer weather, you'll do construction, mowing, and other activities related to airport maintenance.

#### Basic requirements/qualifications

- You need to be able to read and write English.
- You need at least a high school diploma. A two- or four-year degree is helpful if you want to move up the career ladder. You'll get regular training in-house.
- An interest in aviation is helpful.
- You also need to be highly safety conscious.
- You should be willing to learn to operate lots of different equipment.

## A scary winter flying story

*Author's note: Dean Regenold is my dad. He's an adventurer and a bit of a risk taker, so I knew he'd have at least one good story to*

One cold winter night, Dean Regenold, a charter pilot with 35 years of experience, hunched inside his coat and trudged out to the twin-engine Cessna

310. He started the plane and let it idle a few minutes, just long enough to warm up the engine. Then he shut it down and headed back inside the terminal to wait.

*tell about winter flying. MR*

His boss and four other passengers were late. It was nearly 6:00 p.m. They'd been scheduled to leave at 4:00.

While Regenold waited, the weather turned colder, hovering around 0 degrees Fahrenheit. A foot of snow lay on the ground.

Every 30 minutes, Regenold went out to start the plane. His "super cheap" boss had asked him to do that instead of having the airport crew preheat the plane before take-off because the preheating service cost extra.

**"The right engine blew oil all over the windshield."**

Finally, around 8:30, five large, chatty men arrived with too much luggage.

Everyone climbed aboard. Their luggage was crammed behind the third row of seats (the plane had six seats in all). The passengers laughed and talked.

They took off. As the plane climbed through layers of clouds, ice formed on the leading edge of the wings.

As they flew through 5,000 feet on their way to 6,000 feet, "the right engine blew oil all over the windshield," Regenold said.

The chatty passengers went quiet. The right engine was dead. Snow had

**Meanwhile the wings**

clogged the right oil vent.

**were continuing to ice up.**

Each time Regenold had started the plane while waiting for his passengers, the propeller blades were likely picking up snow and throwing it into the right engine nacelle (the engine housing).

He immediately feathered the right engine so the propeller was perpendicular to the airflow and would create less drag. Meanwhile the wings were continuing to ice up and the deicing boots weren't breaking it all off.

Should they turn around or keep going?

Regenold decided to keep going. The weather was slightly better at their destination, Coffeyville, Kansas. Plus the airport was an old Air Force training base and had a very long runway.

To compensate for the icy wings and the single engine, Regenold had to approach the runway at 20 knots, quite a bit above normal speed. He needed a lot of runway to slow down.

"We landed with a thud," he said. Scared but safe.

Michele Regenold is the editor of *Go!*.

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# Brr! Cold weather construction

by Michele Regenold

Minnesota isn't usually balmy in January.

Unless you call -18 degrees Fahrenheit

balmy.

Matt Faiferlick and his crew were drilling an

18-inch diameter, 2,500-foot long bore

through rock in Jordan, Minn. So as not to disturb a special archeological site, they had to work in the winter.

Workers on the US 20 Iowa River bridge dealt with cold and heights.

They were doing directional drilling, so everyone was working on top of the ground, in the wind, instead of underground in a trench or a tunnel, out of the wind. The only relief they had from the -40 degree wind chill was climbing in the truck or the computer trailer for a few minutes. There was a tent surrounding the drilling system to keep the pumps from freezing, but it didn't do much for the crew.

Moving around was one way to stay warm, so one day Faiferlick built a snowman. The snowman made the rounds of the job site, including a visit to the porta-potty. "It kept morale up," said Faiferlick, a project manager and former field supervisor with Miller the Driller. Working in such cold is tough.

The snowman visited every important part of the job site. Photo

"Construction is a business of extremes," says Kris Young, president and chief executive officer of Miller the Driller, a horizontal boring/tunneling contractor in Des Moines, Iowa.

A **contractor** is a company that's hired by a client to complete a specific project, like paving five miles of four-lane highway, or constructing a bridge, or drilling tunnels for water mains.

courtesy of Miller the Driller.

Construction workers deal with extreme weather, from searing heat to numbing cold, as well as extremely long work hours in the summer and often winter layoffs.

Employees for Manatt's, a paving company headquartered in Brooklyn, Iowa, work "an extreme amount of overtime," says Drew Manatt, a project manager with Manatt's. Eighty-hour weeks are not uncommon, especially during the long days of summer. Neither are seven-day work weeks.

Because they work so much during the seven- to eight-month paving season, most people can make a living, Manatt says, even with winter layoffs.

Charlie Meyer, a concrete finisher with Manatt's for 23 years, says a person can make $25,000–$30,000 during the paving season. In the winter when he's laid off, Meyer earns extra money by recycling aluminum transmissions.

This Manatt's paving crew got caught in an early snowstorm. Photo courtesy of Manatt's.

A **concrete finisher** works behind the paving machine. He or she uses a long-handled tool called a float to seal the surface of the wet concrete, kind of like smoothing the icing on a cake.

Most Manatt's employees collect unemployment during the off season. Their annual insurance costs are all paid for

during the paving season so that even while they're laid off, they're covered.

In Iowa, most road paving work stops around Thanksgiving. In mild years, it may last into December.

When winter rolls around, many road workers get laid off. Most of them are rehired by the same company the following spring.

During the winter months, some laid-off workers enjoy spending more time with their families. Manatt's employs a number of Mexican immigrants who like to visit their families in Mexico for several weeks during the winter.

Not all types of road construction stop when the snow flies. Bridge construction doesn't depend on ground temperature, so it can continue a while longer. During extremely cold winters, contractors may decide to shut down for a few weeks until the worst weather passes.

In Iowa, "10 months is the typical season for bridge work," says Ryan Cheeseman, a project engineer with Jensen Construction, "but every year is different."

### Why roads aren't paved in cold weather

In cold weather states, road paving doesn't occur year round because the paving materials, asphalt and concrete, are sensitive to the cold.

Asphalt, the black stuff, must be placed when the ground is at least 40 degrees Fahrenheit or warmer. Concrete, the white stuff, can be used at a lower ground temperature, down to 24 degrees Fahrenheit.

The ground temperature can differ a lot from the air temperature. In the fall, even if the air temperature is below freezing, the ground may still be plenty warm from months of summer heat. In the spring, the ground is still thawing, so it may be significantly colder than the warm spring breeze.

If either asphalt or concrete is used on ground

long. And roads aren't cheap. Just ask the local, state, and federal governments that hire construction contractors to build the roads.

When it's finished in 2008, the Interstate 235 rebuilding project in Des Moines will cost about $429 million.

In southern states, work can continue even longer. If you go far enough south, road work is a year-round activity.

Specialized contractors like Miller the Driller can also work year-round. The temperature underground in a 60-inch tunnel is the same no matter what the weather's like above ground. The wind may be blowing like crazy, but as long as it's not pouring down rain or snowing heavily and it's at least 15 degrees Fahrenheit, Miller employees work.

Young says frostbite is the main concern. Since some drilling techniques require water, it's important that workers don't get wet, especially when it's cold.

Road construction workers deal with heat and cold, long hours and lay offs. But when "you find something you like to do," says Matt Faiferlick, "you never 'work' another day in your life."

## About the jobs

### Road construction worker (entry level)

Do you like to work outside? Use your hands? Work with equipment? Maybe get a little dirty? In construction, there are lots of opportunities and many different kinds of skills you can learn on the job. You may learn how to finish

concrete like Charlie Meyer, drive a ready mix truck, or operate various pieces of equipment.

### Basic requirements / qualifications

- A desire to do the work. Kris Young says she'd "much rather hose off a fanatic than warm up a corpse."
- A willingness to learn. Training is usually available on the job.
- Reliability. You have to show up regularly.
- For some contractors, you need to be 18 or older.

An additional quality that Miller the Driller looks for is a willingness to travel. Some of their projects take a few weeks to several months to complete at locations that are several hundred miles or more from Des Moines.

## Project engineer

If you enjoy doing something different every day, and working indoors and outdoors, working for a contractor as a project engineer may be your thing. You'll be working at a desk sometimes, doing paperwork, making estimates on upcoming jobs, and coordinating and scheduling subcontractors (like underground construction). You may also be in charge of field survey operations. You'll help oversee the actual construction of a project, like a bridge or a stretch of road, and see it completed.

### Basic requirements / qualifications

You'll need a bachelor's degree in construction engineering or civil engineering. In high school, take as many math and science courses as you can so you're prepared for the college engineering courses.

# Construction work can provide unique experiences

by Matt Faiferlick, Miller the Driller

Miller the Driller crews have drilled under rivers, creeks, streets, highways, bridges, intercoastal waterways, swamps, along railroads and ancient archeological sites.

We have worked in weather conditions ranging from -18 degrees Fahrenheit (with -48 degrees wind-chill) to 108 degrees Fahrenheit (with 117 degrees heat index). We have seen blizzards and drought, tropical storms that dump six inches of rain in 1.5 hours, and a dust devil and two tornadoes in the space of four days in Florida.

**I've also enjoyed the company of rattle snakes, copper heads, water moccasins, alligators, dolphins . . .**

I have worked around ancient Indian villages, a herd of deer estimated to be over 600 strong, and the return migration of the snowy egrets to the salt marshes in Atlantic City, New Jersey. I've also enjoyed the company of rattle snakes, copper heads, water moccasins, alligators, dolphins, sting rays, bald eagles, golden eagles, osprey, swans, scorpions, a snow white doe in Oklahoma, and a black bear in Virginia.

I visited John F. Kennedy's grave and on the same day stood at the foot of the nation's capitol while the U.S. flag was flown at half mast in honor of his son's untimely death. I looked east one morning as the sun rose over Tampa Bay and witnessed the launch of the space shuttle almost 200 miles away.

I have touched the Atlantic, the Pacific, and parasailed over the Gulf of Mexico. I've traveled to 25 of the 50 states plus the District of Columbia.

A “boring” job? You bet.

Michele Regenold is the editor of *Go!*.



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# School spotlight: Iowa State University

by Michele Regenold

A helikite (part kite, part helium

Iowa State University offers four different majors related to transportation:

1. Civil engineering
2. Construction engineering (with an emphasis in heavy/highway)
3. Community and regional planning

4. Logistics and supply chain management

balloon) flies near Iowa State University's campanile.

## Civil and construction engineering

At Iowa State, the first couple years of engineering study are similar for students in civil engineering and construction engineering. They take several of the same engineering classes.

Iowa State civil and construction engineering students get hands-on practice with surveying techniques.

For either major, it's a good idea to take as many high school math and science courses as you can to help prepare yourself for the rigors of studying engineering.

So what's the difference between civil and construction engineering?

Basically, civil engineers design and construction engineers build.

Professor of Civil Engineering Reg Souleyrette says, “The way you design a highway curve to meet physical limitations of driver and vehicle is civil engineering. The way you schedule contractors and use technology to control

equipment and construct the curve is construction engineering.

Professor-in-Charge of Construction Engineering Chuck Jahren says, “Construction engineers have to visualize how things will be built—build it in their minds.”

Construction engineering deals with how to get things done. Students in this major are interested in watching things get built. They get in the field and work with the people actually doing the construction. Students who major in construction engineering frequently work for private construction companies. In the United States, most highway construction is done by private companies.

Civil engineering, on the other hand, deals more with the way things like roads and bridges are designed. Students who major in civil engineering may work for private engineering consulting firms or for a government agency such as a state department of transportation or for a city or count government.

### For more info

See http://www.ccee.iastate.edu/academics/majors.html

## Community and regional planning

If you know the computer game Sim City, then you've got an idea what community and regional planning is all about. If not, the goal of planning is to build communities that are nice places to live.

The community and regional planning major is more artistic and more multi-disciplinary than civil and construction engineering, says Adjunct Associate Professor David Plazak. It focuses more on the social sciences and geography

rather than the hard sciences and math.

“It's a good field for generalists,” Plazak says, “because you get into law, computer science, geography, and little bit of engineering.”

Students majoring in community and regional planning can specialize in transportation and land use. They may find jobs with cities, metropolitan and regional planning agencies, and private engineering and planning consulting firms.

### For more info

See http://www.design.iastate.edu/CRP/

## Logistics and supply chain management

In this major, you learn how to manage the flow of products and materials. This includes managing the transport of raw materials like iron ore, or semi-finished products like car parts, or finished products like computers.

If you like to do puzzles, this major may appeal you. You need to be able to think about how all the different pieces fit together. Being comfortable with numbers helps too.

“The fun part,” says Associate Dean Mike Crum, “is working with lots of different people inside your own company and also with people outside like vendors and customers.”

You need to be a people person and be able to juggle lots of tasks.

Students majoring in logistics and supply chain management usually work for private companies, like big distributors of goods such as Target. Some students also find jobs with non-profits such as America's Second Harvest.

## For more info

See http://www.bus.iastate.edu/LSCM/.

Michele Regenold is the editor of *Go!*.



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# Train your brain

by Michele Regenold

Michele Regenold is editor of *Go!*.



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# Historically speaking: Snowplows past and present

by Michele Regenold

Before those newfangled horseless carriages became popular, people got around in the snow on foot, on horseback, or in horse-drawn sleighs. Snow didn't need to be plowed off the roads.

Once cars and trucks became more popular, people expected to be able to use them year round—including in the winter. That meant the snow had to be removed from the roads.

Here are a variety of snowplows that have been used over the years in Iowa. (All the photos below are courtesy of the Iowa Department of Transportation.)


This plow has a V-shaped blade that helps push snow off to both sides. It was used in the 1920s.

Blades on the front of this plow chopped up the deep, hard snow and blew it many feet away.

Dragging a plow behind a tractor worked too.

Since the time of this snowplow, the blades have gotten significantly larger.

Usually you see motorgraders like this one on gravel roads, not Interstates.

Snowplows used in the 21st century often use a wing plow, like the one visible above, in addition to the blade on the front of the truck. The two blades together help push the snow off the road and shoulder.

Michele Regenold is the editor of *Go!*.



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Email to a friend

# Green scene: Fighting the white stuff

by Michele Regenold

Despite snow and ice, Americans like to keep moving. They expect their roads and

streets to be passable and their planes to keep flying.

## On the roads

Plowing snow is the most familiar way of keeping streets and roads clear, but it's just one tool. The government agencies responsible for roads usually use sand and chemicals too. But what effect do they have on the environment?

Spraying anti-icing before a storm helps prevent ice and snow from bonding to the pavement. Photo courtesy of the Iowa DOT.

The City of Des Moines, Iowa uses four different materials to handle snow and ice:

1. Sand
2. Salt (sodium chloride) in solid form and in a liquid, 23% solution called brine
3. GeoMelt, a product made from beets
4. Liquid calcium chloride

William Stowe, assistant city manager of public works/engineering in Des Moines, says that the main environmental concerns about using these materials are air and water quality.

Sand causes dust when it's put down and as traffic rolls over it. The city picks it up with street sweeping equipment when it's warmer than 32 degrees Fahrenheit.

In Iowa the bigger concern is water quality. If sand gets into streams, it can make the water cloudy. It also adds to the sediment.

Sodium chloride and calcium chloride aren't too great for water quality either. If they get into a stream, they have a negative impact on organic organisms.

Cost of the materials is an issue. Brine costs about five cents per gallon. GeoMelt, which has much less negative impact, costs about 50 cents per gallon.

Stowe says, "We're very conscious about using materials sparingly and only if there's a public safety issue."

## Chemicals and planes

The deicing fluids used on aircraft are toxic to aquatic life in high concentrations (see this issue's feature story "Winter weather flying: How do they do that?"). When the deicer is sprayed on planes, some of it falls onto the ground, where it mingles with melting ice and snow.

At the Des Moines International Airport, this untreated runoff used to end up in Yeader Creek, where much of the fish and insects disappeared. Since 2000, the airport has had a special underground system (it holds four million gallons) that collects the contaminated runoff from areas where planes are deiced. This gets fed through a special pipe and carried to the city's wastewater treatment plant.

Deicing fluid helps keep planes safe, but it's not so great for the environment if the runoff gets into streams. Photo courtesy of Kris Klop, Des Moines International Airport.

John Wheeler, the Des Moines International Airport's environmental manager, says there were no signs of aquatic life in winter of 1997, but "there's pretty good aquatic life now."

Protecting the environment isn't cheap. The airport spent over $10 million to build and operate its runoff containment system.

It's a tricky balancing act between public safety and the negative environmental impacts of snow fighting materials. Stowe says, "We'll always weigh on the side of public safety."

Michele Regenold is the editor of *Go!*.

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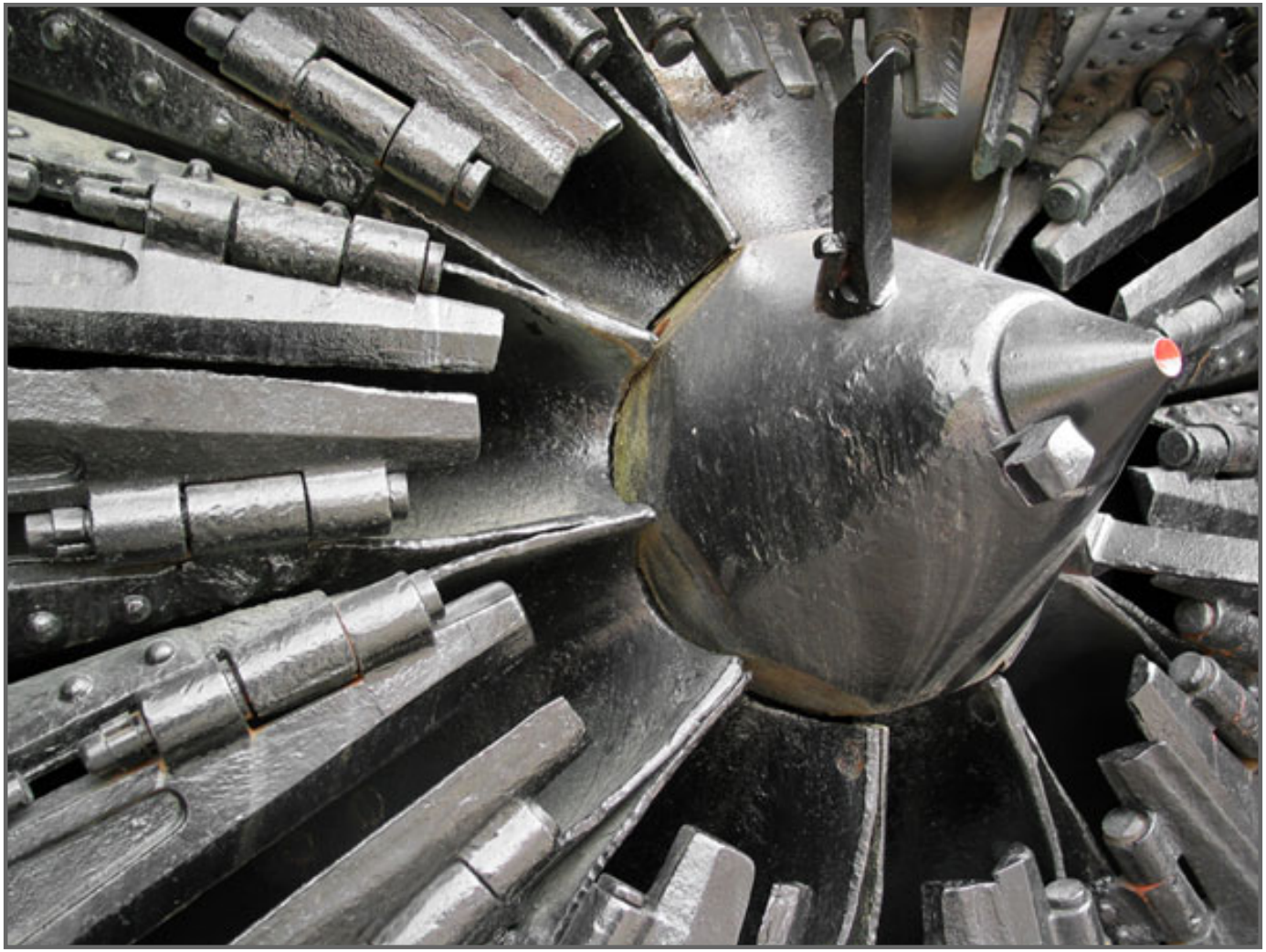
# Mystery photo

by Alison Weidemann



Can you identify the object in the photo above? **Send your best guess by February 15, 2007** to editor@go-explore-trans.com.

After the deadline, we'll randomly choose a winner from the correct entries. The winner will receive a *Go!* t-shirt.

Good luck!

# And the answer is

A railroad snow plow.

Congratulations to Ben Hucker of Ames, Iowa, who submitted the only correct answer.

He wrote, “I believe the mystery picture is the front of a railroad rotary snow plow. Similar to a snow blower, the blade in the picture rotates, pulling snow into the machine. There is then a secondary blower (which spins much faster) that propels the snow through the air, well clear of the railroad tracks.”

Alison Weidemann is the art director for *Go!*.



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